International X-ray Observatory (IXO)

The Impact of Radiation-Driven Disk Winds on the X-ray Spectrum of AGN

D. Proga (University of Nevada, Las Vegas), N.J. Schurch (Chinese Academy of Sciences), C. Done (Durham University)

INTRODUCTION:

- We use simulations of radiation-driven disk winds presented in Proga & Kallman (2004), in conjunction with XSCORT (Schurch & Done 2007), to compute the most realistic models to date of AGN X-ray spectra observed through an accretion disk wind.
- The wind simulations provide a set of self-consistent physical properties for the outflow that mitigates many of the problems inherent to previous XSCORT simulations.

RESULTS:

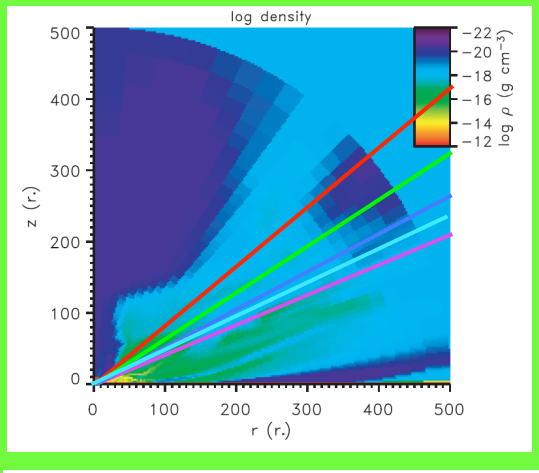
- The properties of the synthetic spectra depend on the line-of-sight (l.o.s) inclination angle and clearly reflect the three distinct regions apparent in the original hydrodynamic simulation:
  (1) Very equatorial l.o.s encounter extremely Compton thick column densities and the resulting spectra are dominated by Compton scattering and essentially neutral absorption.
  (2) Polar l.o.s encounter small, highly ionized, column densities, and the synthetic spectra are largely featureless.
  (3) L.o.s that intersect the transition region between these extremes encounter moderately ionized, marginally Compton thick column densities that imprint a wide range of absorption features on the spectrum (see Figures).
- Spectra from l.o.s through the polar and transition regions show highly-ionized, blue-shifted, Fe absorption features in the 6.7-9 keV range that are qualitatively similar to features observed in the X-ray spectra of a growing number of AGN.
- Our synthetic spectra predict that high accretion rate AGN are likely to be strongly effected by obscuration, in sharp contrast to the clean picture that is generally assumed, based on the observed relation between the opening angle of the molecular torus and AGN luminosity.

Based on work by

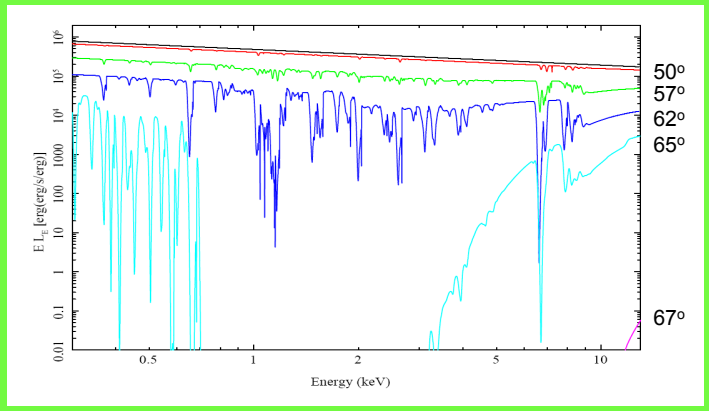
Proga, D. & Kallman, T.R. 2004, ApJ, 616, 688

Schurch, N. J. Done, C., & Proga, D. 2008, ApJ, in press (arXiv0810.0884)

Schurch, N. J. & Done, C. 2007, MNRAS, 381, 1413



Sherlock or IXO



TOP: A snapshot from a time-dependent axi-symmetric hydrodynamical simulation of a disk wind in a quasar. BOTTOM: Broad band spectra computed based on the wind simulation for several l.o.s. marked by color lines on the snapshot.